



Weatherford®

Reservoir Stimulation

ZetaFlow™ *Conductivity Enhancer, Fines Control and Load Recovery Agent*

Weatherford's *ZetaFlow* system is a new and industry-unique patented chemical solution that enhances conductivity and provides fines control in a variety of stimulation fluids and applications. The system also provides enhanced load recovery during flowback operations.

Applications

The *ZetaFlow* system can be used on many formation types including a variety of sandstones, coals, and shales. By modifying the zeta potential of proppant surfaces and bringing them to near neutral values, the potential for particle agglomeration is increased, optimally aligning the proppant to enhance conductivity of the proppant pack.

Fines control is achieved in the same manner; when formation particles are treated with the *ZetaFlow* solution, the zeta potential of the fines is minimized to promote particle agglomeration. Potentially production-damaging particles are fixed in place without restricting production flow.

The *ZetaFlow* system's unique chemistry leaves the formation less hydrophilic and in the optimal wetted condition for increased load recovery.

Advantages

- Increases proppant pack conductivity and enhances flow capacity
- Controls the migration of damaging fines for optimal productivity
- Leaves formation in the optimal wetted condition
- Is added to the stimulation fluid as an on-the-fly liquid additive
- Enhances load recovery of treatment fluids
- Is easy to use, contributing to an operationally simple process

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Usage

The ZetaFlow solution is added continuously “on the fly” in both slick-water and borate cross-linked gel systems at a constant loading level per quantity of proppant.

Proper chemical loadings for remedial cleanup treatments are engineered to the specific application.

Physical Properties

Appearance	Clear, dark liquid
Density (lb/gal)	8.59 to 8.76
Specific gravity	1.03 to 1.05
pH [5% in IPA:water (3:1)]	5.7 to 6.9
Flash point	88.3°F 31.3°C
Ionic charge	Cationic
Solubility in water	Dispersible
Freeze point	< -49°F < -45°C

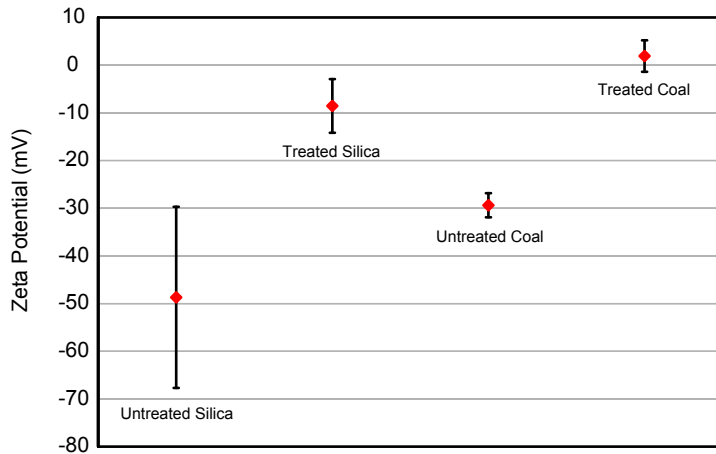


Fig. 1. ZetaFlow reduces zeta potential of silica and coal particles. Samples were ground to 325-mesh size; samples were treated with six gallons of ZetaFlow per 1,000 lb of solid material.



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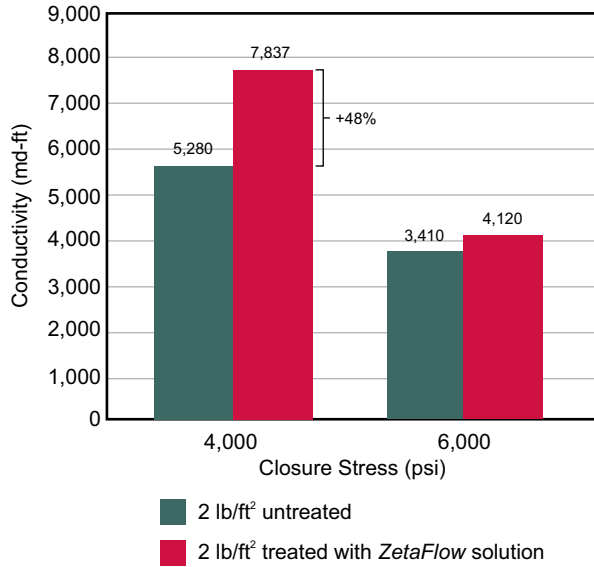


Fig. 2. Conductivity comparison: 20/40 lightweight ceramic proppant with and without ZetaFlow treatment.*

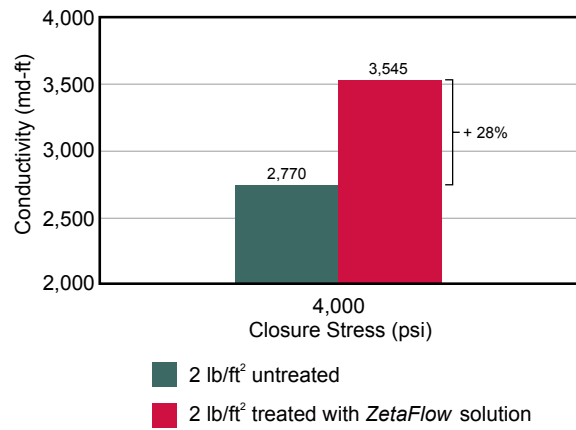


Fig. 3. Conductivity comparison: 20/40 frac sand with and without ZetaFlow treatment.*

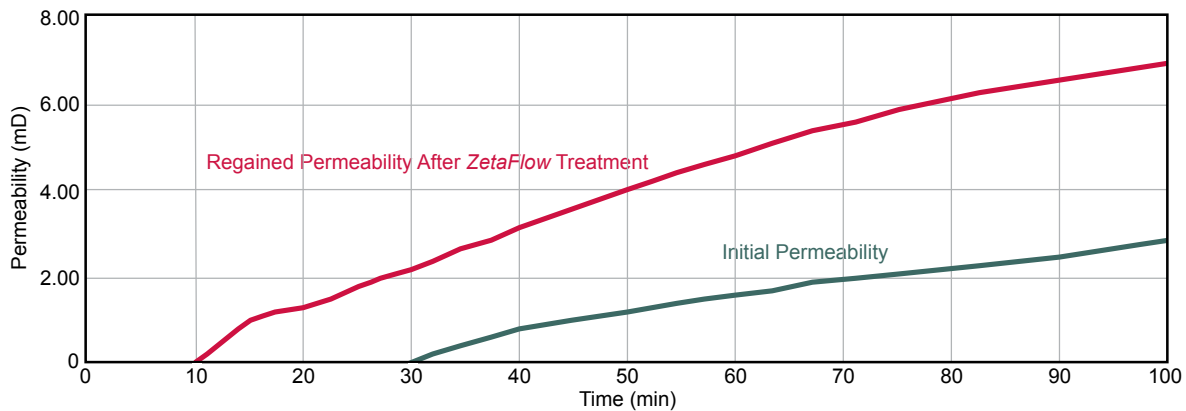


Fig. 4. In core flood experiments at constant ΔP , ZetaFlow shows significant improvement in permeability.

* 150°F, 2% KCl, data provided by Stim-Lab, Inc.